9. Limber Pine Ecological Series

Table 09-1. Full names and short names for the ecological types in the Limber Pine Ecological Series.			
Ecological Type Code	**Name**	**Plant Association Code**	**Short Name**
FL11	Limber pine/common juniper–Very shallow soils–Rocky bouldery convex ridges and rockslides, >9,000 ft	PIFL2/JUCO6	Limber pine/common juniper–Rocks

This is the *Pinus flexilis* series of Pfister and others (1977), Layser and Schubert (1979), Hoffman and Alexander (1980), Hess (1981-1986), Steele and others (1981-1983), Mauk and Henderson (1984), Alexander (1985-1986- 1988), Komárková (1986-1988), DeVelice and others (1986), and Muldavin and others (1990). Stands characteristically occupy dry, cold, windswept, steep, rocky sites. Patches of limber pine within a stand are genetically variable (Torick and others 1996). Stands are typically small to medium in size, usually forming isodiametric mapping units.

Vegetation, Climate, Soils

Limber pine stands are unsuitable for timber management of any kind because tree productivity is very low, stands are sparse, and tree regeneration is sporadic (Pfister and others 1977, Hoffman and Alexander 1980, Steele and others 1983, Mauk and Henderson 1984, Hess and Alexander 1986, Komárková and others 1988). The sites are usually steep, rocky, and difficult to access. Tree form is poor for both limber pine and Douglas-fir (Steele and others 1983), and limber pine is not considered a commercial species.

Table 09-2. Climate		
Characteristic	**Value**	**Reference**
Precipitation zone	360 mm/yr (230-450 mm/yr) 14 in/yr (9-18 in/yr)	Steele and others 1981-1983
Mean annual air temperature	4.3°C = 39.7°F	Steele and others 1983

Fire Management

Stands of this series are considered to be Fire Group 6, which includes limber pine habitat types occurring below upper timberline. Fire frequency is probably highly variable (Crane 1982). Insect and disease disturbances in these stands are poorly known.

Range and Wildlife Management

Livestock make extremely light use of these sites because of their low productivity, rockiness, steepness, and wind exposure.

The large limber pine seeds are important food for rodents and birds, some of which cache the seeds, and for bears which eat the seeds from the trees as well as raiding the caches (Komárková and others 1988). Unexcavated squirrel or bird caches are an important means of limber pine reproduction and distribution (Steele and others 1983, Benkman and others 1984). Limber pine stands often have their origin in bird migrations, especially by nut-eating birds such as Clark's nutcracker. Clark's nutcrackers and red squirrels are responsible for much of the predation on limber pine seeds in northern Arizona (Benkman and others 1984).

Stands on rocky, exposed ridges are used by bighorn sheep (Hess and Alexander 1986, Alexander 1986, Komárková and others 1988). Bull elk sometimes use these sites for standing lookouts, since the views are usually spectacular. Otherwise, big-game use is light to none, forage and browse values are low, and wind exposure is high (Komárková and others 1988).

Recreation, Roads & Trails, Scenery

Stands are not suitable for roads and trails, because they are steep, rocky, and windy, but they are usually small enough that roads and trails can be routed around them. Revegetation is usually unnecessary.

Scenic value is usually spectacular, but few humans see these sites, even on foot, because of their inaccessibility. Such sites are not suitable for dispersed or developed recreation because of their steepness, rockiness, slope instability, and wind exposure.

Table 09-3. Characteristics of Ecological Types within Ecological Series 4 in the Upper Gunnison Basin.
Numbers are shown in form *Average (Minimum-Maximum)*

Code Short Name	No. Samples	Elevation, ft	Avg. Aspect, °M (r) Slope, %	Soil Coarse, %	Depth, cm Mollic, cm	Surface: Coarse, % Bare, %	Cover, %: Trees Shrubs Graminoids Forbs	Total Live Cover, % No. Species TLC/NS, %
FL11 Limber pine/common juniper–Rocks	2	9,390 (9,000-9,780)	204 (0.12) 38 (22-53)	79	28 10	36 (20-53) 6 (1-10)	36 (27-45) 9 (2-16) 8 (0-16) 9 (1-17)	61.7 (29.6-93.9) 28 (27-28) 2.2 (1.1-3.4)

FL11 **LIMBER PINE/COMMON JUNIPER–ROCKS** PIFL2/JUCO6

Limber pine/common juniper–Very shallow soils–
Rocky bouldery convex ridges and rockslides, >9,000 ft

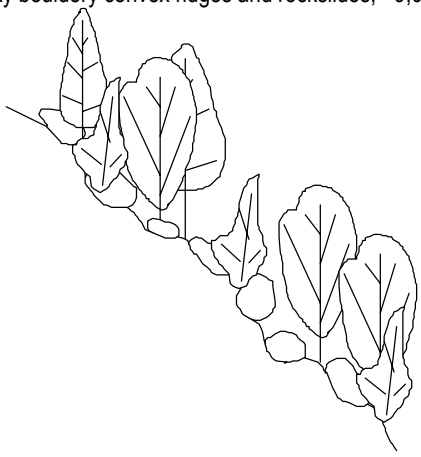

Figure 09-1. Cross-section of vegetation structure of *Limber pine/common juniper–Rocks*.
Aspects are non-northerly, and slope angles average 38%.

Limber pine/common juniper–Rocks is an unusual type on convex, rocky ridges and rockslides, with very shallow soils. It is found on southerly Subalpine slopes in the Gunnison Basin. This type is also known from Idaho, northwestern Wyoming, throughout Colorado, and in northern New Mexico and southern Utah. *Limber pine/common juniper–Rocks* is characterized by limber pine (PIFL2), Douglas-fir (PSME), common juniper (JUCO6), and ocean-spray (HODI). It is also distinguished by its position on convex, exposed talus slopes and rocky ridges. See Table 09-6 for common species names and codes.

These are sites where rocks and gravity are dominant, not vegetation. Hence on these sites characteristics such as rock size, lithology, and slope are more important for classification than vegetation. Vegetation succession probably follows changes in the rock surface and the infrequent and slow soil formation processes. *Limber pine/common juniper–Rocks* is apparently related to *Tall shrublands–Extremely rocky*, which is also distinguished by ocean-spray and common juniper, but which lacks trees.

This is the plant association *Pinus flexilis/Juniperus communis* of Steele (1979), Hoffman (1980), and Peet (1975). Horizontal obstruction has not been measured in these stands, but it is probably not relevant. The wildlife using these sites includes picas (conies) and marmots.

Summary of Ecological Type Characteristics

1. Explanation of symbols in Appendix A. Percentages in [brackets] indicate the percentage of plots sampled that have that characteristic.

NUMBER OF SAMPLES	2, soil descriptions from 1 of these (total 2)
ELEVATION	9,390 ft (9,000-9,780 ft); 2,862 m (2,743-2,981 m)
AVERAGE ASPECT	204°M (r = 0.12)
LITHOLOGY	Granite
FORMATIONS[1]	Xg
LANDFORMS	Ridges, rockslides, rock falls
SLOPE POSITIONS	Upper backslopes, shoulders
SLOPE SHAPES	Convex both horizontally and vertically
SLOPE ANGLE	37.6% (22-53%)
SOIL PARENT MATERIAL	Residuum or colluvium
COARSE FRAGMENTS	36.5% (20-53%) cover on surface, 0.0% (79-79%) by volume in soil
SOIL DEPTH	28 cm; 11 in
MOLLIC THICKNESS	10 cm; 4 in
TEXTURE	Various textures, very bouldery (rocky)
SOIL CLASSIFICATION	Lithic Eutroboralfs or Lithic Cryorthents, shallow to very shallow
TOTAL LIVE COVER	61.7% (29.6-93.9%)
NUMBER OF SPECIES	27.5 (27-28)
TOTAL LIVE COVER/NO. SPECIES	2.2% (1.1-3.4%)
CLIMATE	Cold, very dry, rocky Subalpine rockslides.
WATER	Very little water on these sites in any form, even in the "soils," since they are made of rocks.

Community Type

A *Limber pine-Douglas-fir-common juniper-ocean spray-rocky* is dominated by rocks and gravity, but limber pine is usually 10-30% cover. Douglas-fir may be subdominant among trees. The shrub and herbaceous layers are sparse to very sparse, with dry site shrubs such as common juniper and ocean-spray the only conspicuous species.

Table 09-4. Community types within *Limber pine/common juniper–Rocks*.

Community Type	ns	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Layer Height, m Lr Avg Lyr Cvr %	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Obstruction %: 1.5-2.0 m 1.0-1.5 m 0.5-1.0 m 0.0-0.5 m Total<2m
A. Limber pine-Douglas-fir-common juniper-ocean spray-rocky	2	9,390 (9,000-9,780) 37.6 (22-53)	79 28 10	36 (20-53) 6 (1-10)	*	36 (27-45) 9 (2-16) 8 (0-16) 9 (1-17)	28 (27-28) 62 (30-94) 2.2 (1.1-3.4)	*

*. Unknown: measurements were not taken in this CT.

Table 09-5. Resource Values for *Tree juniper–Coarse dark soils–Steep southerly*. Resource values were calculated from the numbers in Table 09-4, relative to the whole UGB.

The numbers in this table can be translated: 0 = Very Low, 1 = Low, 2 = Moderately Low, 3 = Moderate, 4 = Moderately High, 5 = High, and 6 = Very High.

	Community Type		Community Type
Resource Value	**A**	**Resource Value**	**A**
Potential Cattle Forage Production	0	Deer & Elk Forage & Browse	2-3
Grazing Suitability	ns[1]	Need for Watershed Protection	0
Potential Timber Production	0-1	Soil Stability	5-6
Timber Suitability	ns[1]	Risk of Soil Loss-Natural	0-1
Developed Recreation	ns[1]	Risk of Soil Loss-Management	0
Dispersed Recreation	ns[1]	Risk of Permanent Depletion-Range	ns[1]
Scenic	5-6	Risk of Permanent Depletion-Wildlife	0
Road & Trail Stability	Stable but expensive	Risk of Permanent Depletion-Timber	ns[1]
Construction Suitability	Stable but expensive	Resource Cost of Management	0-1
Deer & Elk Hiding Cover	3-4	Cost of Rehabilitation	0

1. Not suitable.

Table 09-6. Common Species in *Limber pine/common juniper–Rocks*, where Characteristic cover > 10% or Constancy > 20%. "–" means that the species is not found. Dead cover is not listed. Ccv = Characteristic Cover, Con = Constancy. If Avc = Average Cover, then these are related using the formula Avc = Ccv•100%/Con.

Code	Species	Ccv (Con) N = 2	Common Name
	TREES		
PICO	Pinus contorta	5 (50)	lodgepole pine
PIFL2	Pinus flexilis	31 (100)	limber pine
POTR5	Populus tremuloides	T (50)	quaking aspen
PSME	Pseudotsuga menziesii	2 (100)	Douglas-fir
	SHRUBS		
HODI	Holodiscus discolor	1 (100)	ocean-spray
JUCO6	Juniperus communis	3 (100)	common juniper
LEPU	Leptodactylon pungens	1 (50)	granite gilia
MARE11	Mahonia repens	T (50)	Oregon-grape
PAMY	Paxistima myrsinites	T (50)	mountain-lover
RIIN2	Ribes inerme	3 (50)	whitestem currant
ROWO	Rosa woodsii	3 (50)	Woods rose
SYRO	Symphoricarpos rotundifolius	5 (50)	mountain snowberry
	GRAMINOIDS		
AGROS2	Agrostis	T (50)	bentgrass
AGSC5	Agrostis scabra	3 (50)	rough bentgrass
CAREX	Carex	T (50)	sedge
CAGE	Carex geophila	4 (50)	dryland sedge
ELEL5	Elymus elymoides	T (50)	bottlebrush squirreltail
FETH	Festuca thurberi	4 (50)	Thurber fescue
KOMA	Koeleria macrantha	T (50)	prairie junegrass
POA	Poa	T (50)	bluegrass
PONEI2	Poa nemoralis ssp. interior	3 (50)	interior bluegrass
PORE	Poa reflexa	2 (50)	nodding bluegrass
	FORBS		
ACLA5	Achillea lanulosa	1 (50)	western yarrow
AMLA6	Amerosedum lanceolatum	T (50)	yellow stonecrop
ASTER	Aster	1 (50)	aster
BODI4	Boechera divaricarpa	T (50)	false-arabis
CIAU3	Ciliaria austromontana	10 (50)	spotted saxifrage
DEIN5	Descurainia incana	T (50)	Richardson tansy mustard
DRAU	Draba aurea	T (50)	golden whitlow-wort
ERIGE2	Erigeron	T (50)	fleabane
FRVI	Fragaria virginiana	4 (50)	Virginia strawberry
GIPI	Gilia pinnatifida	1 (50)	sticky gilia
HEVI4	Heterotheca villosa	T (50)	hairy golden aster
NOMO2	Noccaea montana	T (50)	candytuft
POHI6	Potentilla hippiana	T (50)	horse cinquefoil
SENEC	Senecio	T (50)	groundsel
SEIN2	Senecio integerrimus	T (50)	lambs-tongue groundsel
FORB	forb unknown	T (50)	unknown forb
	GROUND COVER		
.BARESO	bare soil	6 (100)	
.LITTER	litter and duff	58 (100)	
GRAVEL	gravel 0.2-10 cm	5	
.COBBLE	cobble 10-25 cm	– –	
.STONES	stone > 25 cm	T (50)	
.MOSSON	moss on soil	– –	
LICHENS	lichens on soil	15	